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equations are $3^3+4^3+5^3=6^3$, $1^3+6^3+8^3=9^3$, $3^3+10^3+18^3=19^3$,

$7^3+14^3+17^3=20^3$, $4^3+17^3+22^3=25^3$, $11^3+15^3+27^3=29^3$.

Then the three positive integer numbers are $x=\dfrac{11^3+15^3}{2}$, $y=\dfrac{11^3+27^3}{2}$,

$z=\dfrac{15^3+27^3}{2}$. Also x, y, z may be found from any equation, including the algebraicsum, for the sum of three cubes=a cube, by first multiplying each cube by 2^3.

Also solved by *O. W. Anthony, H. W. Draughon, C. D. Schmitt, and G. B. M. Zerr.*

PROBLEMS.

27. **Proposed by J. W. NICHOLSON, LL. D., President and Professor of Mathematics, Louisiana State University and A. and M. College, Baton Rouge, Louisiana.**

Required a formula for finding five integers the sum of whose cubes is a cube.

28. **Proposed by DAVID E. SMITH, Ph. D., Professor of Mathematics, Michigan State Normal School, Ypsilanti, Michigan.**

Decompose the product 97.673.257 into the sum of two fourth powers.

AVERAGE AND PROBABILITY.

Conducted by B.F.FINKEL, Kidder, Missouri. All Contributions to this department should be sent to him.

SOLUTIONS OF PROBLEMS.

13. **Proposed by I. L. BEVERAGE, Monterey, Virginia.**

Find the mean values of the roots of the quadratic $x^2-ax+b=0$, the roots being known to be real, but b being unknown and positive.

Solution by P. S. BERG, Apple Creek, Ohio, and JOHN DOLMAN, Jr., Counsellor-at-law, Philadelphia, Penn., and J. M. COLAW, A. M., Principal of High School, Monterey, Virginia.

Solving the given equation, $x=\frac{1}{2}a\pm\sqrt{(\frac{1}{4}a^2-b)}$.

Therefore, if b be positive and x real, b cannot exceed $\frac{1}{4}a^2$. If β be the smaller of the two roots, its mean value, therefore, is

$$(1\div\tfrac{1}{4}a^2)\int_0^{\frac{1}{4}a^2}\beta db=\frac{4}{a^2}\int_0^{\frac{1}{4}a^2}(\tfrac{1}{2}a+\surd(\tfrac{1}{4}a^2-b)db=\frac{4}{a^2}[\tfrac{1}{2}ab]_0^{\frac{1}{4}a^2}+\frac{4}{a^2}[\tfrac{1}{12}\surd(a^2-4b)^3]_0^{\frac{1}{4}a^2}$$

$$-\frac{a}{3}=\frac{a}{2}-\frac{a}{3}=\frac{1}{6}a.$$

The mean value of the larger root is, therefore, $\frac{5}{8}a$.

Also solved in a similar manner by *Professors Matz, Zerr, and Draughon.*

14. Proposed by CHARLES E. MYERS, Canton, Ohio.

$\frac{1}{3}$ of all the melons in a patch are not ripe, and $\frac{1}{4}$ of all the melons in the same patch are rotten, the remainder being good. If a man enters the patch on a dark night and takes a melon at random, what is the probability that he will get a good one?

Solution by H. W. DRAUGHON, Olio, Mississippi, and G. B. M. ZERR, A. M., Principal of High School, Staunton, Virginia.

Let $12n$=the whole number of melons in the patch. Then $4n$ are not ripe and $3n$ are rotten. The $3n$ rotten melons may be included in the $4n$ not ripe melons in which case there would be $8n$ good melons, or the $3n$ rotten may not be included in the $4n$ not ripe melons in which case there would be $12n-(3n+4n)=5n$ good melons.

$\therefore$ there cannot be less than $5n$ nor more than $8n$ good melons.

$\therefore$ the chance of a good one$=\frac{1}{2}\left(\frac{5n+8n}{12n}\right)=\frac{13}{24}$.

The chance of a not ripe one$=\frac{1}{2}\left(\frac{n+4n}{12n}\right)=\frac{5}{24}$.

The chance of a rotten one$=\frac{1}{2}\left(\frac{0+3n}{12n}\right)=\frac{1}{8}$.

The chance of a not ripe and rotten one$=\frac{1}{2}\left(\frac{0+3n}{12n}\right)=\frac{1}{8}$.

$\therefore$ $\frac{13}{24}+\frac{5}{24}+\frac{1}{8}+\frac{1}{8}=1$ as it should be.

Solutions o this problem were received from *P. S. Berg, F. P. Matz, J. M. Colaw,*

15. Proposed by F. P. MATZ, M. Sc., Ph. D., Professor of Mathematics and Astronomy in New Windsor College, New Windsor, Maryland.

Todhunter proposes: "From a point in the circumference of a circular field a projectile is thrown at random with a given velocity, which is such that the diameter of the field is equal to the greatest range of the projectile: prove the chance of its falling within the field, is $C=2^{-1}-2\pi^{-1}(\surd 2-1),=.236+$." Is this result perfectly correct as to fact?

First Solution by the PROPOSER.

Let P be the point from which the projectile is thrown, $AP=2a$, and $\angle APB=\theta$. Now, if ϕ=the angle of elevation at which the projectile is thrown, and C'=the chance for any given value of θ; then, evidently, the required chance becomes